(1) *A First Year's Course of Inorganic Chemistry.* By G. F. Hood. Pp. iv+107. (London: Rivingtons, 1910.) Price 1*s.* 6*d.*

(2) *A Manual of Elementary Practical Chemistry for Use in the Laboratory.* By P. W. Oscroft and R. P. Shea. Pp. viii+134. (London: Rivingtons, 1910.) Price 2*s.*

THESE two little volumes are for use in schools, and are intended to serve as an introduction to chemistry. Oscroft and Shea's manual carries the subject to the stage of equivalent weight estimations and simple gravimetric and volumetric analysis, whilst Hood's book, which is a first year's course, stops short of this point. Both books contain descriptions of a series of easy quantitative experiments on loss and gain in weight, as well as a detailed account of a variety of thoroughly instructive preparations.

There is nothing in either that strikes one as very new or original in conception or arrangement; but, on the other hand, there is nothing to which objection can be taken, and both volumes may be recommended without reservation. It might be well in a future issue to give the actual results of the quantitative experiments so that both teacher and student might form some idea of the accuracy attainable. In conclusion, we question to what extent it is permissible to adapt a classical discovery to the intelligence of a schoolboy; for it may be doubted if either Berthollet, Gay-Lussac, or Davy ever thought of chlorine as "murium dioxide" (Hood, p. 51). J. B. C.

Catalogue of the Books, Manuscripts, Maps, and Drawings in the British Museum (Natural History). Vol. iii. (L–O). Pp. iv+1039–1494. (London: British Museum (Natural History), 1910.) Price 20*s.*

THE long interval which has elapsed since the publication of the second volume of this catalogue (see NATURE, August 25, 1904)—which followed the first (*ibid.*, October 22, 1903) in reasonable time—is explained in the preface as due to other library work. Apparently the earlier sheets of this volume were completed and printed off before 1907, as we find no title associated with the name of Sir E. Ray Lankester, while the latest of his works referred to bears the date of 1906. In this connection it may be noted that in some cases the full Christian names of authors, as in the case of Sir E. R. Lankester and Sir R. Owen, are repeated in each entry, whereas in other instances, as in the case of Sir Charles Lyell, these are reduced to the initials after the first entry. Apparently the compiler was compelled to follow the order adopted in the library catalogue at Bloomsbury, which will probably account for the sundering of such names as Loennbohm (p. 1163) and Lönnberg (p. 1175). Like its predecessors, this volume contains valuable bibliographical information, and it is to be hoped that we shall have the pleasure of welcoming the fourth volume at an early date. R. L.

The Calendar of Garden Operations. New and enlarged edition. By members of the staff of the *Gardener's Chronicle.* Pp. vi+175. (London: *Gardeners' Chronicle,* Ltd., 1910.) Price 6*d.* net.

THIS is a new edition of a work prepared originally by Sir Joseph Paxton, and published in 1842. It is a concise and practical manual from which possessors of small gardens in country or town may obtain much useful advice and guidance. Chapters have been added on the cultivation of trees and shrubs in towns, and on the principles of intensive culture or French gardening. In its enlarged form the continued success of the book is ensured.

LETTERS TO THE EDITOR.

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of NATURE. *No notice is taken of anonymous communications.]*

Separating Power of a Telescope.

CAN an observer inform me what are the proper telescopic powers, and apertures or sizes of glasses, required to see stars which are apart from each other the following distances, and of different magnitudes?

(1)	...	0″ to 1″	(5)	...	8″ to 12″
(2)	...	1 to 2	(6)	...	12 to 16
(3)	...	2 to 4	(7)	...	16 to 24
(4)	...	4 to 8	(8)	...	24 to 32

Gore made a table showing the magnitude of the faintest star visible in any telescope in his "Stellar Heavens," but I would like to see if anybody can make a table out from *experience and ordinary practical observation* in the case of double and multiple stars. Where the glare of one star interferes with the definition of another star, I am inclined to think a larger aperture is needed in the case of doubles and multiples than in singles, and where the stars are very close. If a table could be made out for reference by students it would be useful.

Grimscar, Huddersfield. J. W. SCHOLES.

THE questions proposed cannot be answered quite so definitely as Mr. Scholes would appear to think. To begin, we must have a clear idea of what is meant by the separating power of a telescope. Put in a theoretical form, it means: Given two points of light (stars) a certain angular distance apart, what is the size objective which will just give two distinct images in the focus? For practical purposes, this is answered by the formula

$$\text{Separating power} = \frac{4''\cdot 56}{a}$$

where a is the aperture of the object-glass in inches.

This can easily be remembered; or, if it is preferred, a table can readily be formed, thus:—

Size of O.G. Inches		Separating power ″
1	... ...	4·56
4	... ...	1·14
8	... ...	0·57
28	... ...	0·17
36	... ...	0·13

A second of arc in the focus of the 28-inch Greenwich refractor is 0·00163 inch. Let it be clearly understood that this table gives the theoretical size of object-glass to obtain *separate points in focus.*

If the points are not separated in the focus, no amount of magnifying power will afterwards separate them.

This does not imply that the unaided eye, looking at the focal images in the telescope, can detect duplicity. The points to be thus seen must subtend at the eye an angle of at least 60″. It is here that the eye-piece comes in, for, given two separated points, we can magnify the separation until the eye can not only detect, but can see it sufficiently to enable micrometric measures to be made.

Hence we use eye-pieces magnifying 2, 3, 4, 5 times, and so on.

These eye-pieces bring up the total magnifying power, which is quoted as the power used. It is stated in text-books that a power of 50 or 60 per inch aperture is the practical limit; but it is readily seen, however, that the power used is dependent on several conditions:—

(1) Size of object-glass.
(2) Quality of object-glass.
(3) Condition of the atmosphere.
(4) Personality of the observer.
(5) Subject observed.

The questions asked refer especially to double-star work, and confining ourselves to this simplifies matters.

If we allow 50 per inch aperture, we should expect to find observers with the

36-inch Lick, using a power of	... ...	1800
28-inch Greenwich ,, ,,	... ...	1400
18½-inch Dearborn ,, ,,	... ...	950
8-inch (Maw) ,, ,,	... ...	400
6-inch (Solà) ,, ,,	... ...	300

Atmospheric conditions affect the large glasses much more than the smaller, for we find in actual practice that the Lick observers prefer powers of 1000 and 1500; the Greenwich observers prefer 670 and 1120; Hough, with the 18½-inch, used generally a power 390, and less frequently 925.

Maw uses powers of about 300 and 400 on both his 6-inch and 8-inch, while Solà uses 350 on his 6-inch.

When an observer is quite used to his instrument and his eye-pieces, he develops a preference for one particular eye-piece under most all conditions.

One element, as yet not mentioned, has naturally a great influence in the choice of an object-glass, viz. the range of visibility, or the ability to show faint objects. The above remarks apply to pairs the components of which are fairly equal; but, in general, distant companions are very faint.

The light-grasping power of a telescope depends on the surface or diameter squared of the object-glass. A good 1-inch object-glass should show a ninth-magnitude star, and one star is said to be a magnitude fainter than another when its light is 2·5 times less.

Consequently, the aperture must be $\sqrt{2\cdot5}$ greater to show it. Roughly, $\sqrt{2\cdot5}=1\cdot6$, and hence if 1 inch shows a ninth magnitude $1\times1\cdot6$, or a 1·6-inch shows a tenth magnitude, or generally

Star magnitude	9	10	11	12	13	14
Aperture in inches	1·0	1·6	2·5	4·0	6·3	10·0

Of course, this table is not to be taken too seriously, as it is governed by much the same conditions as already mentioned for separating power. Bear in mind Burnham's words: "An object-glass of 6 inches one night will show the companion to Sirius perfectly; on the next night, just as good in every respect, so far as one can tell with the unaided eye, the largest telescope in the world will show no more trace of the small star than if it had been blotted out of existence."

I hope, with a little twisting and adaptation, the foregoing remarks may be made to answer the fundamental principles underlying the apparently easy questions.

Mr. Scholes is quite right as to the glare, and the larger aperture by increasing the separation, and by making the apparent discs smaller, does make observation easier.

T. LEWIS.

Colour-vision.

As one who was responsible for the testing for colour-vision of several thousands of drivers and firemen, I should like to refer to the method of testing by means of different coloured skeins of wool.

The usual method is to take a particular skein of wool and request the person who is being tested to select in succession the three or more skeins which mostly resemble it. In some cases I found that men who were clearly colour-blind succeeded in passing such a test satisfactorily.

It must be remembered that a colour-blind person has been accustomed to consider his capacity for appreciating colour differences in the light of other people's statements. It thus comes about that they learn to consider differences, which are really colour differences to those whose sight is normal, as being partly due to intensity of light, texture, or other considerations. They are aware, of course, that they cannot always detect differences of colour in the ready way that others can, but they also feel that they can often see differences much more quickly than can others. With the colour-blind, therefore, the capacity for matching or naming colours becomes more and more perfect the greater their experience becomes of the objects to be compared. Now, in the case of the wool test, the different coloured skeins are certainly in many cases of different texture, coarseness, or gloss. The skeins are also frequently numbered. With a little careful study of the wools with which the tests are carried out, it may be quite possible for a colour-blind man to get through the tests satisfactorily unless great care is exercised.

I found the following to be a ready method of detecting colour-blindness. The wool skeins were arranged in the order of their brightness, the white skein being at one end and the black at the other. It is, of course, somewhat difficult to estimate the comparative brightness of a red and a yellow object. I found, however, that with a little practice and care this could be done satisfactorily. If a person whose vision is normal be asked to pick out the darkest skeins, he will at once pick the black one and afterwards those next to it. On the other hand, a colour-blind person will probably pick the black skein first and then the reds or greens, the darker shades being selected first. A test of this kind is most striking. In one case, a man who had got through the ordinary tests with some hesitation selected all the reds before the dark greys, neutral tints, greens, &c., although some of the reds were much brighter colours than the greens.

The better plan is to take a number of different coloured skeins of wool and ask the person who is being tested to arrange them in their order of brightness. A markedly colour-blind person cannot do this properly.

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LAKE EDWARD, RUWENZORI, AND THE UGANDA-CONGO FRONTIER.

THE argument lately arrived at by the representatives of Great Britain and the Congo has affected the settlement of a troublesome boundary dispute, in which the competence of any diplomacy to deal with a geographical question in a scientific manner has not shown itself in a particularly favourable light.

The original agreement, the *fons et origo* of all the subsequent mischief, was signed at Brussels on May 9, 1894. By this it was enacted:—

"That the sphere of influence of the Independent Congo State shall be limited to the north of the German sphere in East Africa by a frontier following the thirtieth meridian east of Greenwich up to its intersection by the watershed between the Nile and the Congo, and thence following this watershed in a northerly and north-westerly direction."

At the time this agreement was made the 30th meridian was shown on the maps as dividing Lake Edward into two approximately equal parts, and as passing to the west of the whole Ruwenzori range. It is, however, a commonplace among geographers and surveyors that a determination of longitude in an unsurveyed country is liable to large errors, and that a meridian line is, of all possible boundaries, the worst that can be selected. In this case the actual event proved that the selection of this line had resulted in the maximum of inconvenience and loss. The true position of the meridian was found to be about half a degree east of its position as assumed in 1894, and a strict interpretation of the letter of the treaty would have involved our retirement from Lake Edward and from practically the whole of the Ruwenzori district. Such a contingency was obviously intolerable, and the only practicable course was to arrive at some sort of compromise which should, as far as possible, minimise our loss. The commissioners entrusted with the recent negotiations arrived at what perhaps was the best solution available at this date, and by surrendering to the Congo the whole of the north shore of Lake Albert, they regained the eastern half of Lake Edward, and about half Ruwenzori. The net result of the whole transaction is therefore that we lose all the country lying between Lake Albert and the Congo-Nile watershed and the western half of the Ruwenzori range.

From the geographical point of view the great error